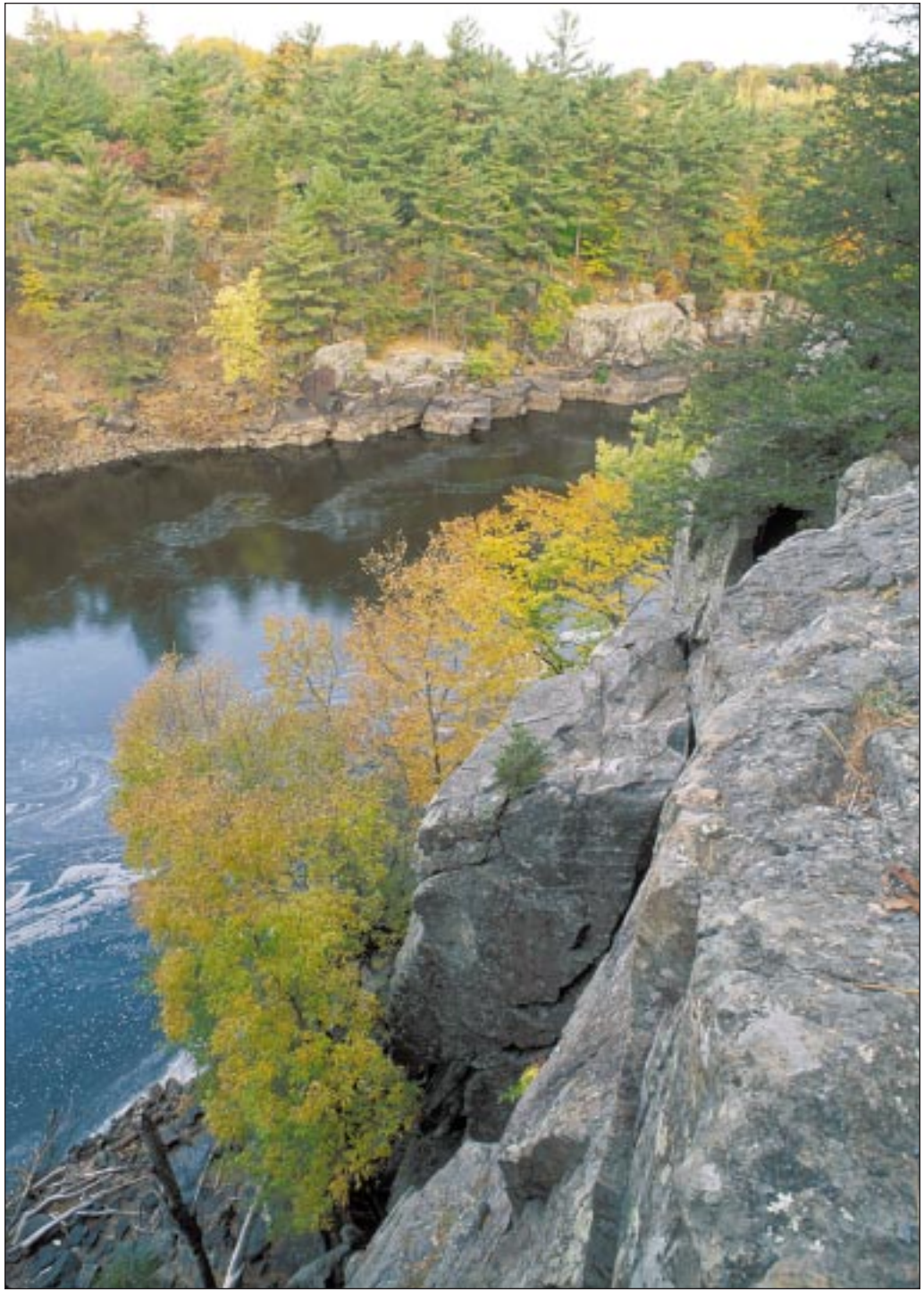

David W. Herrick

State of Wisconsin's Natural Resources

WISCONSIN
DEPT. OF NATURAL RESOURCES

Forrestal Photographics of Madison

I am proud to call Wisconsin my home and equally proud to share with you the progress that we, as Wisconsin citizens, are accomplishing in protecting and maintaining Wisconsin's natural resources. There are many examples of the investments that you have made as businesses and resource management groups to preserve and protect the natural resources that are important to you. Many of us thrive on Wisconsin's natural resources for our livelihoods and recreation. All of us depend on clean air and water for our survival.

Please, take a moment with me to enjoy Wisconsin's waters and the rest of our natural resources and to celebrate the successes of our past, the pleasures of the moment and the opportunities of the future.

—Governor Scott McCallum

Harper Fritsch Studios

I am happy to share Wisconsin's second State of the Natural Resources report. Whatever your interest in the environment of our state, you will find important information in the pages that follow. Perhaps more than anywhere else in the nation, Wisconsin citizens feel deeply a stewardship for natural resources and a responsibility for passing a clean environment on to our children. That motivated citizenry is what has and will protect the special place we call home. In this report, we provide still more examples of what we and you, Wisconsin's citizens, are doing to protect and enhance our precious natural resources.

This edition of the State of Wisconsin's Natural Resources report focuses on Wisconsin's waters. Water and Wisconsin are synonymous. So much of the quality and quantity of Wisconsin's water is dependent upon actions in places other than our water — in the energy we consume, how we drive, in the decisions we make about our homes and businesses and how we maintain our lives. The resulting quality of Wisconsin's waters begins with each of us. Understanding that connection is as critical to our waters as it is to our lives.

—DNR Secretary Darrell Bazzell

State of Wisconsin's Natural Resources

Cover photo: Interstate State Park, Wisconsin's first state park, and the St. Croix River

Left: Great blue heron

State of Wisconsin

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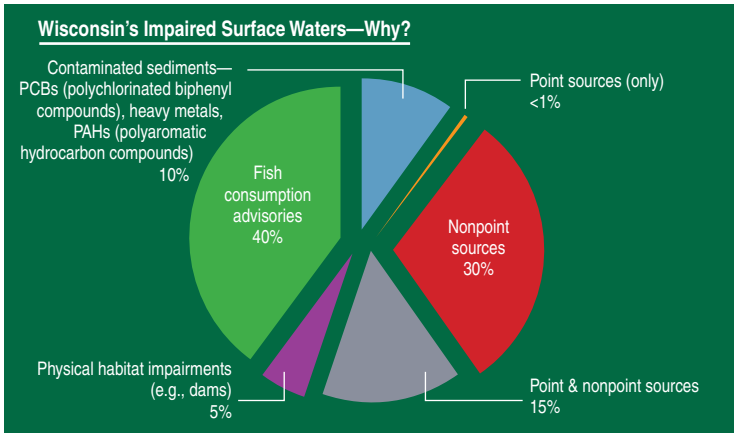
Chapter One

Wisconsin's Natural Resources



There are a number of reasons why some of Wisconsin's waters are not meeting their designated uses, which means they are impaired.

Water is a key element supporting Wisconsin's people, natural resources, communities and economy. Recognizing the great impact of the quality and quantity of our water resources on our everyday lives, it is appropriate to focus on Wisconsin's waters in the Department of Natural Resources' second State of Wisconsin's Natural Resources report.

In this report, you will learn that Wisconsin is not a desert, nor are we awash in too much water. You also will learn that our aquatic resources, while plentiful and home to a fascinating history, are being stressed. Wisconsin has lost over half of its wetlands to development and agriculture. As our population grows, demand for water resources will increase.

We've seen demands placed on our finite resources and concerns raised regarding high-volume wells for bottling spring waters and the potential impacts on local environments and economies.

As we drill for drinking water we sometimes encounter natural contaminants such as arsenic.

While we have made considerable progress limiting point source pollution, a major concern exists over nonpoint pollution, such as water that runs off our lawns, streets, construction sites and farms. Of the 552 surface water bodies listed as impaired in Wisconsin, just two are strictly listed due to point sources of contamination, such as wastewater discharge pipes, and another 15% are listed because of combined point and nonpoint sources of contamination, 30% are listed due to nonpoint sources of pollution. Therefore nearly half of Wisconsin's impaired waters are listed due to nonpoint pollution sources.

As we discuss past successes and present issues, we must also keep future challenges in mind. The challenges become more complex when we consider that Wisconsin's water quality and quantity are tied to what happens on the land and in the air. In this report you also will learn about important environmental and natural resource issues other than water-related issues.

Great opportunities for natural resources improvement are not so much found in additional laws but in changing individual behavior. There are many examples of citizen groups and individuals in Wisconsin—some mentioned in this report—working to protect Wisconsin's natural resources and increase awareness of our environmental impacts. It is the DNR's hope that you'll find comfort in the progress being made to protect Wisconsin's waters and that you'll be motivated to help solve remaining and new problems.

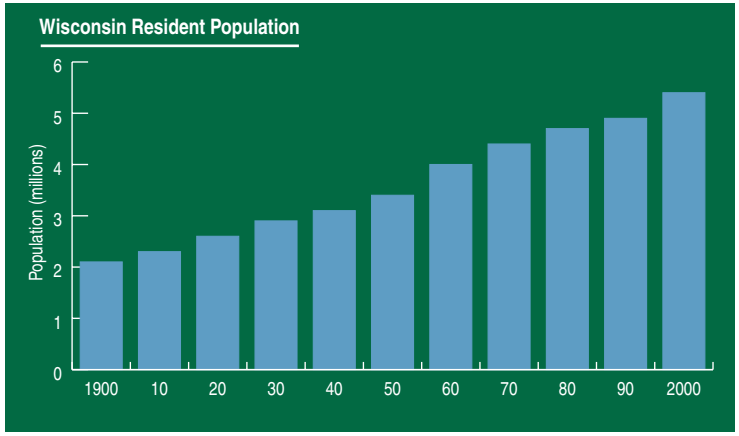
The big picture

The key and intertwined elements of the contemporary Wisconsin ecosystem are the environment, economy and people. We must consider one element in context with the others to present an accurate picture of Wisconsin's natural resources and the impacts that the natural resources have on the economy and people.

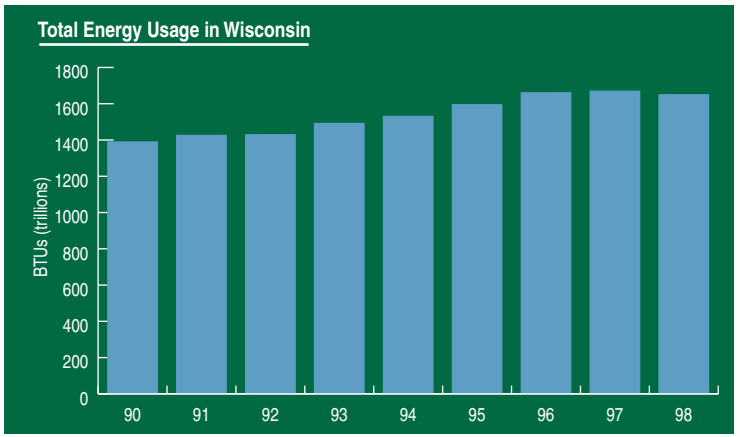
Population trends

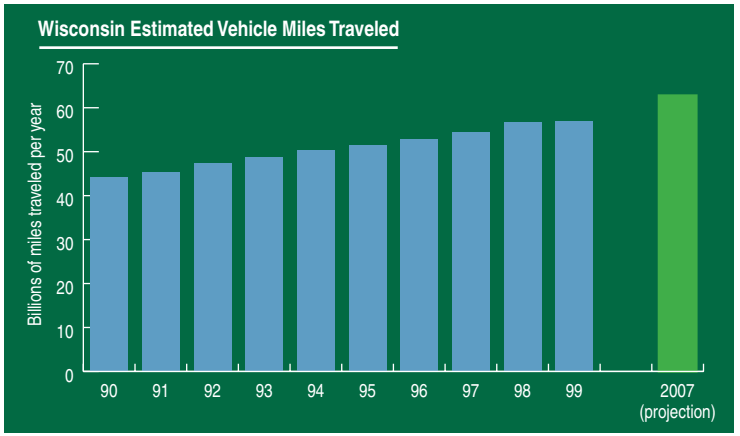
Wisconsin's population has grown by more than 150% over the last century. While that growth is much lower than that of the United States' population—which has grown by about 270% over the same period—the state's population growth rate still pressures its natural resources in demands for more drinking water, highways, homes, waste treatment and disposal, recreation and so on.

In fact, while Wisconsin's population increased by nearly 4% during the 1980s, our population growth relatively boomed during the 1990s with a growth of about 9.6%. In contrast, the U.S. population grew at 9.8% during the 1980s and 13.1% during the 1990s.



DNR Shoreland Management Program





People and pocketbooks, water and environment

More people and a stronger economy create pressure on the environment because of how we live and recreate. The following facts set the stage regarding growth and environmental pressure especially in northern Wisconsin:

- In Vilas County, shoreland property sold for $225 per foot in 1990; today, shoreland property sells for more than $1,500 per foot, a 567% increase while the national consumer price index increased by about 22%.
- Since a 1965 survey of 235 undeveloped northern Wisconsin lakes, two out of three lakes are now developed. In 20 years, undeveloped northern Wisconsin lakes could be rare. (Please refer to the maps on page 26.)
- Since 1969, the number of registered boats in Wisconsin has increased from 303,000 to 564,000.

Energy trends

From 1990 to 1998, energy consumption in Wisconsin grew by 19%, which is less than the growth of our gross state product, but more than Wisconsin's population growth over the 1990s. Energy usage in Wisconsin is an indicator of our efficiency. Since the gross state product is growing faster than our energy usage, this indicates that Wisconsin may be becoming more energy efficient as it grows. The downward trend in energy usage for 1998 is due to a relatively mild winter, according to the Wisconsin Department of Administration's Division of Energy. However, the DNR continues its vigilance on air emissions; as we grow we also should maintain and improve our air quality.

Vehicle miles traveled

The number of vehicle miles traveled (VMT) is another important indicator of natural resource pressure. Changes in the VMT can indicate trends of energy usage, possible air emissions (we also have to consider changes in engine technology that might lower future vehicle auto emissions) and land use. For example, as the number of vehicle miles traveled increases, presumably so does the demand for roads. The demand for roads influences land-use decisions because a piece of highway cannot be used for farms, homes or business. From 1990 to 1999, VMT increased by 23.6%, as compared to a population increase of 9.7% during the 1990s and a gross state product increase of about 27% over a slightly shorter time.

Chapter Two

Protecting Public Health & Safety

When most people think about the DNR, their thoughts generally turn to boating, swimming, hunting, fishing and camping. But one of the most important DNR missions is to help protect the public's health and safety not only in outdoor recreational activities, but in assuring that the water we drink and the air that we breathe are safe. This chapter highlights some trends we see regarding health and safety issues in Wisconsin.

Air emissions

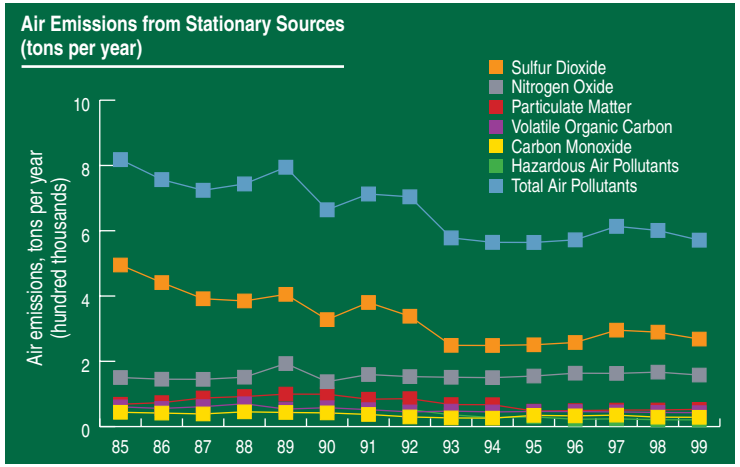
Wisconsin has made some amazing strides in air quality over the past generation and more. One reason is that emissions from stationary sources—such as factories and incinerators—have declined. It's also gratifying to realize that these emissions have stayed low in spite of an increasing state population. This is another sign that Wisconsin's citizens are becoming more diligent about our air quality, and that our businesses and utilities can make progress on air emissions even as our population grows.

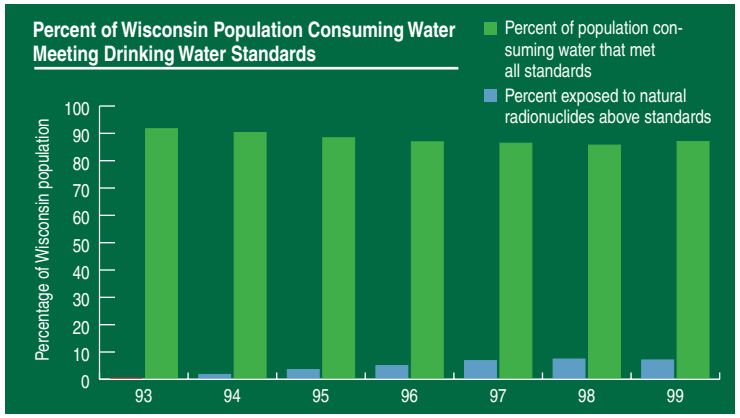
Safe drinking water

Having clean water to drink is critical to our health and safety. Due to improvements in sanitation and treating and delivering drinking water quality over the past century, the incidence of waterborne disease is more rare today than our parents and grandparents experienced. This is no accident. Wisconsin municipalities invest $75 million each year in building and improving drinking water facilities and also spend $150 million each year in wastewater treatment facilities.

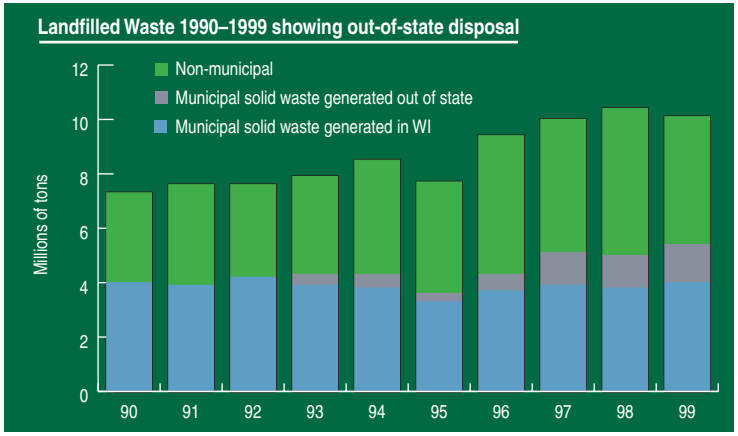
Drinking water treatment facilities are required to monitor the chemical and biological quality of the water they treat and keep records to ensure that water meets the minimum drinking water quality standards.

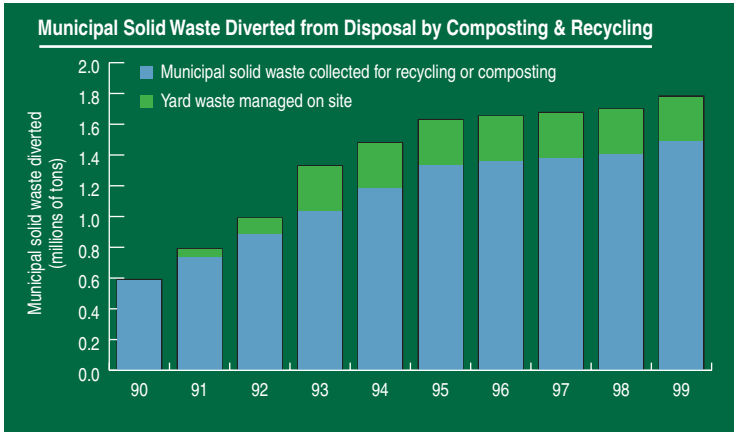
Through facility-led and DNR inspections, violations sometimes are found. Over time, drinking water quality standards have become more stringent based on additional health information. For example, an increasing number of communities are not in compliance with the drinking water quality standards for radium (a radionuclide) and arsenic, which are naturally occurring contaminants. This is because new standards have recently been instituted, become more stringent, or because the community has drilled new wells that tap into aquifers that contain these contaminants.

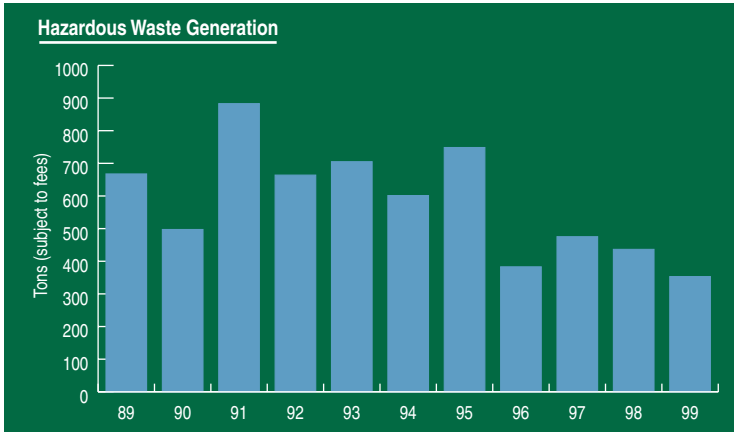




State Lab of Hygiene





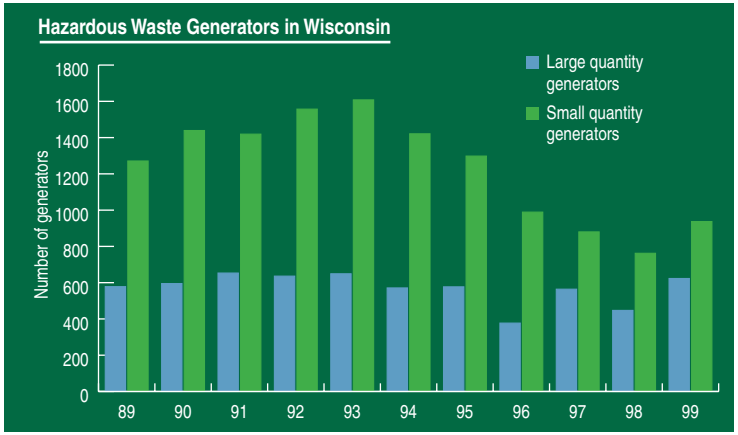


Waste management at home and business

The terms "solid" and "hazardous" waste have strict legal definitions; solid waste typically refers to garbage generated in homes and businesses, while hazardous waste is chemical wastes more often created by industrial processes (although some toxic wastes also are generated in the home).

Proper waste management is important to Wisconsin's water quality. Solid waste, such as litter, is unsightly. In rivers and lakes, solid waste can degrade. The bacteria that help break down the waste remove oxygen from the water. This oxygen is necessary for fish survival.

While proper waste disposal helps prevent problems, reducing solid waste generated in the first place is even better for the environment and economy. Creating waste costs us in terms of dollars and the effect on the environment. While Wisconsin's population and economy have been growing over the past decade, the quantity of solid waste that



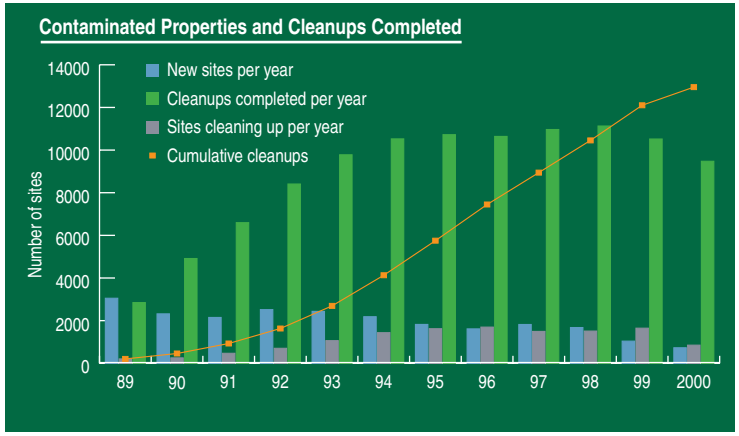
we've generated in our homes has been fairly constant at about 4 million tons per year. In addition, about 35% of the waste that might have gone to our landfills is now composted or recycled.

We're careful with hazardous wastes because smaller quantities can be more damaging to our land, air, water, wildlife and people when compared to solid wastes. Wisconsin's businesses are learning that there's a cost—to the environment and to their profits in terms of waste disposal and cleanup liabilities—from generating waste. As a result, they are reducing the quantity of waste generated even as the economy grows. Similarly, there's a trend in the number of businesses and organizations generating hazardous wastes in Wisconsin. For the most part, the number of hazardous waste generators has declined.

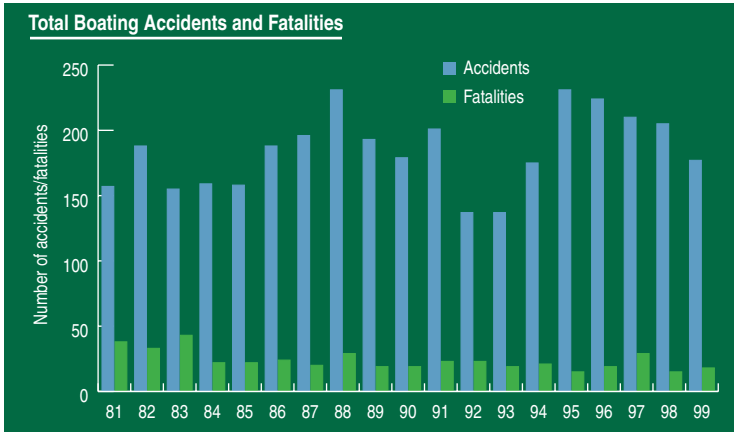
Contaminated property cleanup

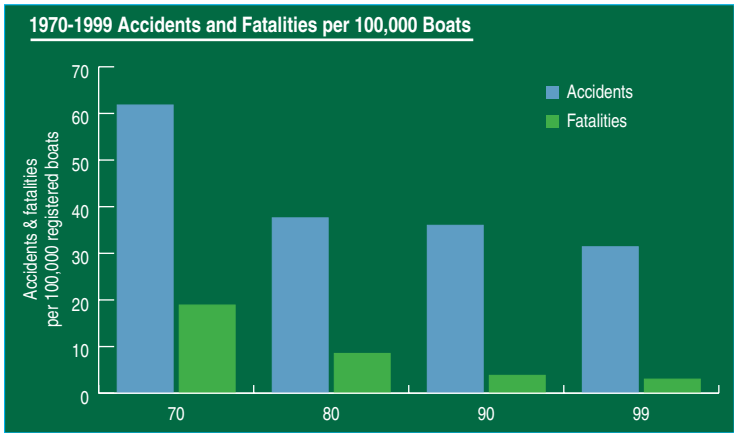
Wisconsin's businesses and municipalities continue to make progress cleaning up contaminated properties. These cleanups are important because they remove the contamination that make these properties a health risk to people, plants and animals. Cleanup also allows unproductive lands to be useful again for businesses. Several state agencies (DNR, Commerce, DATCP) oversee these environmental cleanups. Large-scale cleanups often take more than one year.

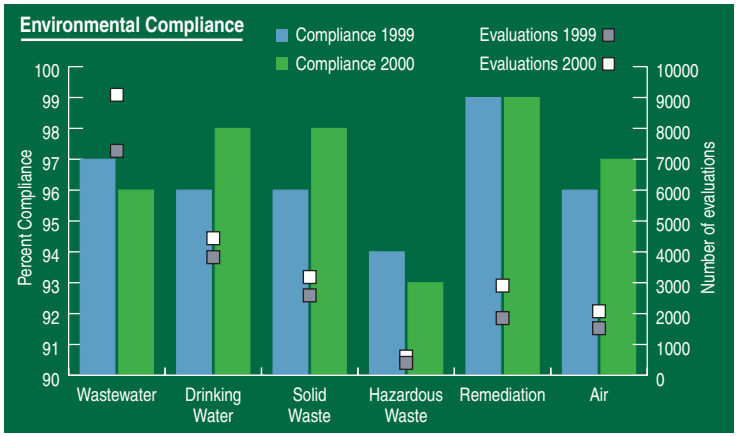
These cleanups are significant for Wisconsin's waters. There are several sites statewide where contaminated sediments persist. An example is the presence of polychlorinated biphenyls (PCBs) in the Fox River sediments. Contaminated sediments pose a risk to the fish and other aquatic life that live nearby, as well as to anglers who might consume these fish. Removing the contamination, or making it inaccessible, reduces the risks so we can live and work with these formerly contaminated lands and waters.



Removal of a leaking tank at a gas station







Boating safety

Wisconsin citizens and visitors have improved their boating skills and safety over the past thirty years. While the number of boating accidents has fluctuated since 1981, there are more boaters today than ever, and yet there is a downward trend in boating fatalities. In 1999, the top five causes of boating accidents were careless/reckless operation, operator inattention, operator inexperience, alcohol and hazardous waters.

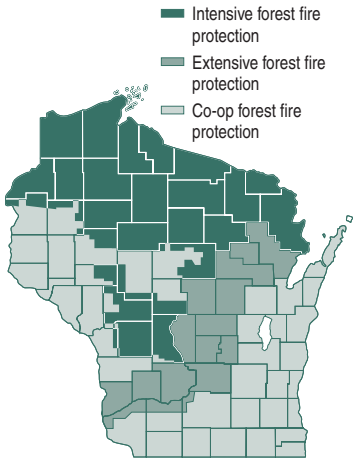
Environmental compliance

Wisconsin's citizens, the DNR, business and municipalities take environmental compliance seriously. The DNR has monitored compliance for a long time, but in 1999 stepped up efforts to compile the compliance information that is obtained through on-site inspections of regulated businesses and municipalities, response to citizen complaints and reports provided by regulated entities.

To date, we have found that most of the regulated entities that the DNR inspects maintain high levels of compliance, with few causing significant violations of Wisconsin's environmental protection regulations.

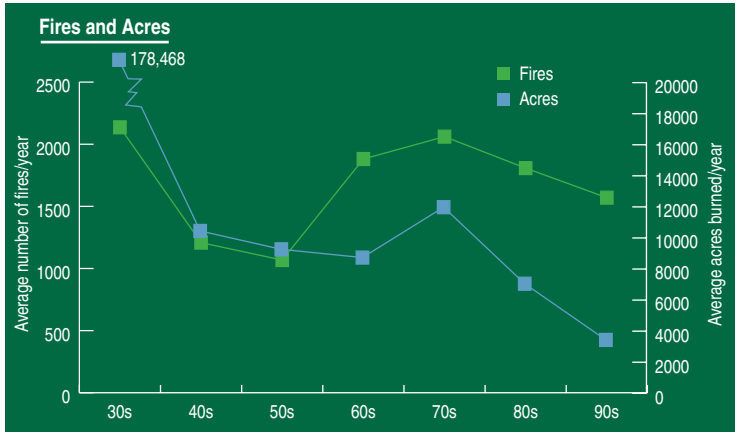
Forest fire protection

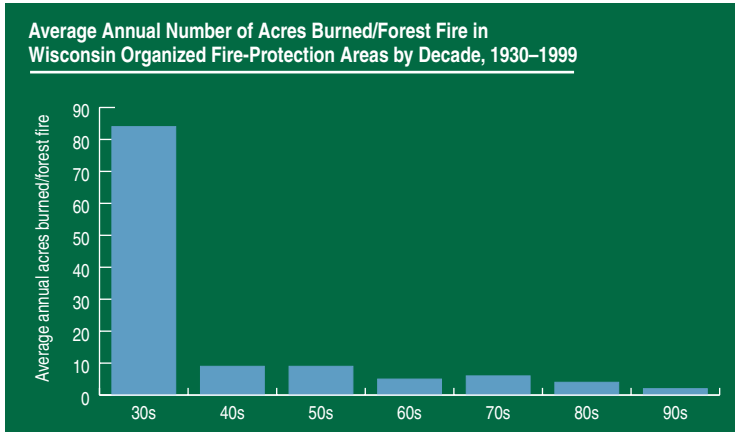
Wisconsin is divided into three types of forest fire protection areas: intensive, extensive, and cooperative. The differences are based primarily on natural variation and susceptibility to fire as well as area forest fire fighting capabilities. Burning regulations and primary forest fire suppression responsibility differ for each of the areas. The DNR has primary fire fighting responsibility for the intensive and extensive fire protection areas, which are primarily in northern and west central Wisconsin and along the Wisconsin River. Local volunteer fire departments are primary responders in the cooperative fire protection area.

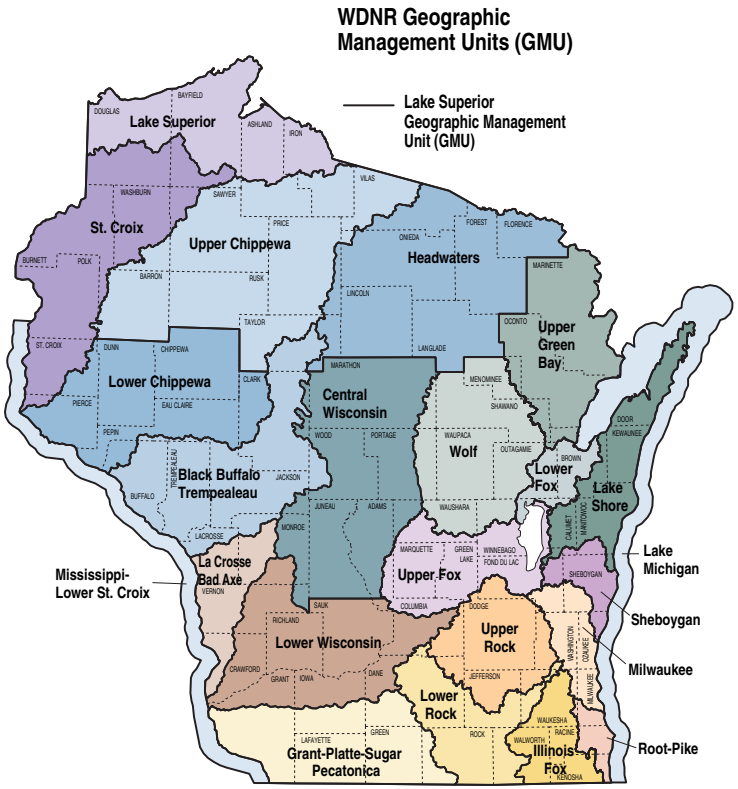


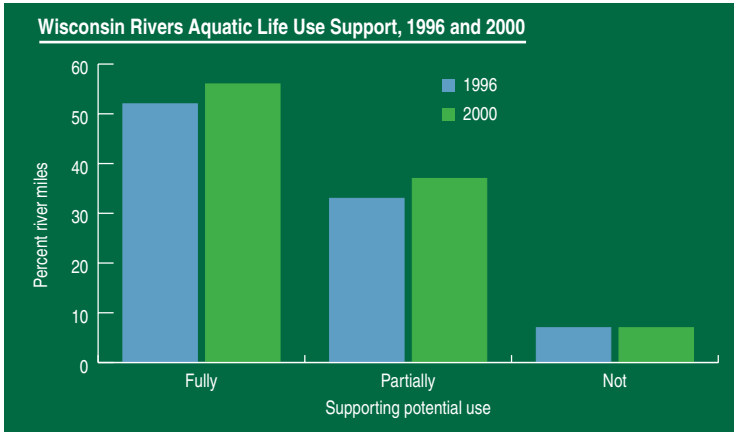
Forest fire protection areas

While the number of fires remained constant, the average annual area burned by forest fires has dropped dramatically in Wisconsin since forest fire suppression was mandated by the State Legislature in the late 1930s. In 1931, over 640,000 acres burned and the annual average acreage burned was almost 180,000 acres. With increasing emphasis on fire suppression to protect life and property, improved firefighter training and better equipment, the area burned each year has declined since then. During the 1930s an average fire burned about 84 acres, while during the 1990s the average was 2 acres (the 90s were relatively wet, which also had an impact on burned acres). In 2000, there were 1,558 forest fires that burned 4,544 acres in the DNR organized fire protection areas.









Chapter Three

Sustaining Ecosystems

The DNR's mission to sustain balanced and diverse ecosystems in Wisconsin recognizes people as an important component of those ecosystems. The agency's reorganization in the mid-1990s charged and challenged the DNR and its partners with protecting Wisconsin's ecosystems, and managing and using them in a way that leaves future generations a healthy environment and a sustainable economy.

Reorganization assigned field staff to work in integrated teams following the natural boundaries of Wisconsin's major river basins. DNR staff work in partnership with representatives from governments, civic groups, businesses, environmental groups and other stakeholders who live and work in those basins. Partners help identify resource conditions and management priorities for their respective basins, which DNR calls Geographic Management Units or GMUs.

Reports describing the environmental health and management activities for each of Wisconsin's 23 GMUs can be found on the Internet at **http://www.dnr.state.wi.us/org/gmu** or check at your local DNR office or public library this year. These reports will focus on meeting performance-based standards developed by DNR and the people who live and work in the specific GMUs.

Wisconsin rivers' potential uses

Wisconsin has a wealth of ecological treasures—15,000 inland lakes, more than 44,000 miles of rivers and streams, 5.3 million acres of wetlands and 2 quadrillion gallons of groundwater. While many of these resources remain intact, a great number are affected by human-induced problems such as excess nutrients, siltation and habitat alterations.

By the end of 2000, DNR had assessed more than 22,000 stream miles and found that 56% are supporting the fish and aquatic communities they should support as well as the recreation, public health and other functions they are expected to provide if controllable impacts to water quality are managed. But nearly half of those waters are threatened due to changes in the watershed. Habitat alterations posed the primary threat for 36%, siltation threatened 30%, and excess nutrients threatened 11%. Low dissolved oxygen levels from organic enrichment, thermal modifications and pathogens rounded out the list. These causes of impaired water quality are primarily due to polluted runoff from farm fields, urban areas and construction sites.

Water quality monitoring program

Agency and partner teams need good information about their basin's natural resources' health to plan for how to best manage those resources. DNR is changing the way it provides such information to give these teams a more complete picture.

Historically, the agency focused on assessing already degraded waterbodies or those that have a high public profile. Such a narrow focus was necessary because limited staff could only make a dent in assessing Wisconsin's vast water resources. The result was a lack of data on Wisconsin's overall water resource quality. In addition, differences in monitoring techniques made data comparison difficult.

To address these concerns, DNR has developed a program of standard techniques to assess and apply statewide to gather baseline data on various streams and lakes in each basin. Not only will this program collect more traditional data about water chemistry and quality, but it will assess the health of waters by how their aquatic habitat, macroinvertebrates and fish communities compare to those in similar waters meeting desired habitat and communities.

This information will determine if a waterbody is supporting the variety of stream life that it should hold. The data will be captured in a centralized database to improve data analysis and make the information more readily accessible to all stakeholders and management partners.

Polluted runoff

Improvements in wastewater treatment have led to better water quality in Wisconsin streams, but polluted runoff from urban, urbanizing and rural areas remain serious problems for streams and lakes. Precipitation runs across city streets, rooftops and parking lots, farm fields, construction sites and roadways picking up fertilizer, manure, soil, chemicals and other pollutants. In most cases, the runoff carries these contaminants directly into Wisconsin waterbodies and groundwater.

Polluted runoff is the primary reason that 30% of 552 waterbodies are included on a list of impaired lakes and river segments that don't support the fish communities, recreation, drinking water or others uses they should support.

In January 2001, the Natural Resources Board approved holding public hearings on proposed rules and performance standards that ask everyone who contributes to runoff pollution to take steps to control it. The proposals overhaul state programs that for 20 years sought to control polluted runoff through voluntary participation.

Livestock operations

Livestock operations can significantly harm water quality if their operators do not properly store manure, incorporate it in fields at the appropriate time, or adequately control runoff from feedlots and barnyards.

State and federal laws require controls for large-scale operations. Wisconsin Pollutant Discharge Elimination System permits require these farms to store manure in a properly designed facility, spread manure according to a management plan guiding where, how and in what amounts they apply manure to the land, and control contaminated runoff. In addition, these operators are required to submit annual reports showing how manure was spread during the previous year.

Smaller operations that haven't needed a permit or faced mandatory controls will be required to do so with the proposed runoff rules. Until recently, DNR investigated smaller farms for problems when the agency received complaints. Now, we are tracking violations of manure management prohibitions on farms when they affect waterbodies on the state's lists of outstanding, exceptional and impaired resources.

Large operations that are currently required to get DNR discharge permits would have the new conditions incorporated into their permits.

Wisconsin Agricultural Stewardship Initiative

Farmers, commodity groups, environmentalists, the University of Wisconsin system, and state and federal agencies have joined Wisconsin's Agricultural Stewardship Initiative for a comprehensive look at air, water and wildlife issues and their affect on farm profitability and quality of life. They're also examining how agriculture affects our physical, social and economic environment. The newly named Pioneer Agricultural Stewardship Farm, UW-Platteville's 400-acre agricultural teaching facility, is the designated systems research farm. Researchers are taking air, water and soil measurements to establish baseline conditions before implementing intensive management activities such as manure application. Early monitoring on the Fever River near the Pioneer Agricultural Stewardship Farm, used the same approach that will be used statewide to gather data on water chemistry, fish composition, aquatic insects and habitat quality. Through this Initiative, farmers will be able to learn how to improve their operations, reduce their environmental impacts and increase their profitability.

Lake and river planning and implementation grants

Lake and river planning and implementation grants help citizens mobilize to protect and enhance the waters they love. The grants provide up to 75% of the funding to local governments, tribes, lake and river management organizations and other conservation-oriented nonprofit groups for nearly everything needed to plan and carry out protection and restoration projects on Wisconsin waters.

In 2000, DNR awarded more than $3 million in grants to 98 organizations and local governments to protect and improve dozens of Wisconsin lakes and rivers. River projects included helping build a fishway on Beckman's Mill dam in Rock County and purchasing land around the Prairie River "Dells," a stunning land feature on a former dam removal site in Lincoln County.

Lake projects included helping five northern counties fund a development process for more protective shoreland area ordinances, and helping restore a land separation between Silver Lake and Silver Creek in Manitowoc County. A highway project dating to 1930 originally diverted the creek directly into the lake, leading to the highest historical sedimentation rate for a lake ever studied in Wisconsin.

Wetland status

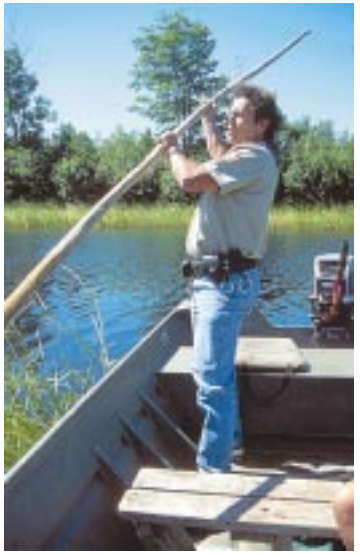
Wisconsin has about 5.3 million acres of wetland remaining from the 10 million acres that covered the landscape before European settlement. These remaining wetlands are critical to sustain wildlife, fish and amphibian and reptile habitat, to serve as flood storage, to protect surface and groundwater quality, and to provide scenic beauty and recreation for boaters, hunters, wildlife watchers and others.

Since Wisconsin adopted wetland water quality standards in 1991, wetland acreage lost as a result of permits approved by the U.S. Army Corps of Engineers has slowed to 347 acres per year from 1,440 per year previously. Wisconsin's wetland standards now require people who want to pursue a project that potentially impacts a wetland to receive DNR water quality certification before applying for a wetland permit from the U.S. Army Corps of Engineers. The applicant must demonstrate how they tried to avoid harming wetlands with their project, and if that isn't possible, must demonstrate that they've minimized the damage their project does to wetlands. No permits are issued, though, if the project would result in significant harm to wetlands. A recent Supreme Court decision has narrowed the scope of the Corps' authority and has left many wetlands vulnerable to filling. The DNR is currently supporting legislation that would restore protection for those wetlands.

For more information on lake and river planning grants visit the Internet at

http://www.dnr.state.wi.us/org/water/fhp/lakes/lkgrants.htm

http://www.dnr.state.wi.us/org/water/fhp/rivers/index.htm



Wetland inspection

For more information on Wisconsin wetlands issues visit the Internet at **www.dnr.state.wi.us/org/water/fhp/waterway/index.htm.**

DNR employees help sample private wells to help protect our health.

To further reduce illegal fills and to restore wetlands where it makes sense, DNR recently developed a new strategy known as "Reversing the Loss." This strategy charts a course for DNR programs involved in wetland education, protection, restoration, enhancement and management to follow over the next six years. Mandatory steps to offset wetland losses also are options for permit applicants.

The goals of the DNR's new wetlands strategy recognize that 75% of Wisconsin's wetlands are in private ownership and the DNR needs to provide those landowners with the tools and the means to manage their wetlands.

Groundwater protection

Wisconsin has a long history of legislation to protect our groundwater. In 1919, the state had the first water supply regulation for public water utilities in the U.S.; the first regulations for private wells in 1936; and the first comprehensive groundwater protection law in 1984.

Progress is being made on a grand scale to restore groundwater quality near landfills, spills and underground storage systems. Hundreds of millions of dollars have been spent to investigate and cleanup contaminated groundwater near these sites. In addition, monitoring ensures that contamination is detected early to reduce the impact and cost of contamination.

New rules that public water systems must meet under the 1996 Amendments to the Safe Drinking Water Act require local government to protect water that could be used for drinking. The DNR is challenged to stay on schedule in providing communities with information regarding water sources and what might contaminate it.

"Smart Growth" legislation passed last year and now many local units of government are working to implement the law. More informed land use decisions can lead to better groundwater protection and quality.

Public debate surrounding the proposed siting of Perrier production wells in Adams County for bottled water brought to the forefront concerns about pumping groundwater and its potential interaction and affect on lakes, streams, springs, wetlands and other surface waters. Wisconsin law does not now directly address this hydrologic connection between groundwater and surface water, nor does it protect natural resources that may be harmed by the operation of a high capacity well.

When human demand for groundwater exceeds the rate at which an aquifer is replenished, the water table declines. Declining groundwater elevations mean that springs and other surface waters will see lower base flows or that flowing water will cease altogether. Such decreases have occurred in large portions of northeastern Wisconsin, where groundwater elevations have

declined as much as 150 feet in the last 50 years. Such decreases also have occurred in the Madison area.

Over the last few years, DNR staff have become aware of situations where high capacity wells have, or had the potential to, harm surface water flows. To the extent lawfully permitted, the DNR negotiates with well operators to prevent as much harm as possible. Cases include stream flow changes at Bloody Run Creek near Wisconsin Rapids, Little Schioc near Bonduel and the Little Plover River near Plover/Stevens Point. Other places of concern include a calcareous fen within Vernon Marsh near Mukwonago and at the Nevin State Fish Hatchery in Fitchburg.

Drilling a well

Fisheries management

When George Becker compiled the *Fishes of Wisconsin* in 1983, he accounted for 157 species of fish: 146 native species, nine of which were considered extirpated, and 11 established non-native species. In the 1999 update, *Wisconsin Fishes 2000: Status and Distribution,* John Lyons, Philip A. Cochran and Don Fago recognized 147 native species, 14 established non-natives and at least 19 more transient non-natives.

Of the 1999 totals, two new native species were discovered, southern brook lamprey and channel shiner, and three endangered species have declined significantly since the late 1970s and are nearly extirpated—striped shiner, pallid shiner and the slender madtom. Five of the established non-natives are considered new species in Wisconsin, but are well established elsewhere—kokanee salmon, threespine stickleback, white perch, ruffe and the round goby.

Wisconsin's fisheries and aquatic resources also face major challenges during the next six years and in response, the DNR has begun a six-year effort to address each of these issues. Habitat continues to be degraded, simplified, fragmented or destroyed by some land and water-use practices, policies and development decisions. We intend to restore 25 miles of trout habitat each year with assistance from Trout Unlimited, local government and other people. With willing communities and their full support, we expect to remove more than 20 obsolete dams and restore habitat in rivers and streams.

DNR expects the number of licensed Wisconsin anglers to increase from 1.4 million to more than 1.5 million during the next six years. While the majority of these anglers will fish on inland lakes and big rivers, 150,000 anglers will fish for Great Lakes trout and salmon and 130,000 will fish for trout on our inland streams. Providing high-quality angling and enough fish to go around remains a challenge.

Much of the fish habitat in Wisconsin is privately owned and affected by local regulations. Federal, state and local government need to work with private landowners to protect and manage natural resources.

Maureen Macozzi

Lake Michigan fisheries

Charter boat fishing was the bright spot on Lake Michigan in 2000 with 9% more hours spent on the water while all other types of fishing experienced double-digit declines in angler hours. Sport fishing was good with a record-breaking coho salmon (26 pounds, 1.2 ounces) and brook trout (10 pounds, 1 ounce) landed. Commercial harvest trends were down, though. Low water levels meant anglers were spending less time on Lake Michigan, which in turn resulted in smaller harvests of Lake Michigan trout and salmon. Anglers spent 2,282,763 hours fishing on the lake in 2000, down about one-quarter from the average time spent in the last five years.

Efforts to control sea lamprey and stock millions of salmon and trout continued on Lake Michigan, since sport fishing would collapse and alewives would again proliferate without those efforts. Lake Michigan's future is unclear, though, because of continuous introduction of new species in the ballast water of ships. Recent examples of stowaways include zebra mussels, spiny water flea and round goby.

Wisconsin is updating its plan to manage Lake Michigan fisheries activities from 2001-2011.The newly formed Lake Michigan Fisheries Forum will play a significant role in the plan development. The forum consists of 17 individuals, representing a broad range of interests and perspectives from sport and commercial fishers to an environmental activist, a sporting goods storeowner, academia, and the U.S. Fish and Wildlife Service.

Lake sturgeon management

Wisconsin's waters possess one of the world's largest self-sustaining populations of lake sturgeon, a species that has been around since prehistoric times, can live up to 100 years, grow to a length of seven feet and weigh more than 200 pounds.The current spawning population of Lake Winnebago lake sturgeon is estimated at 40,000 adult males and 8,000 adult females.

Wisconsin also possesses the longest track record of managing, performing research on and protecting sturgeon in the world, a fact recognized in the state's selection as the first U.S. site to host an international sturgeon conference. More than 250 sturgeon specialists from 20 countries are expected to attend the 4th International Sturgeon Symposium in Oshkosh July 8 to 13, 2001.

DNR manages the fishery through regulations designed to keep the overall annual harvest at or below 5% of the estimated sturgeon population level. Anglers enjoy a spearing season on the Lake Winnebago sturgeon fishery and a hook-and-line season on the Lower Wisconsin and other Wisconsin waters boasting a sturgeon fishery.

Forest fragmentation

The land changes as large forested areas are fragmented into smaller parcels for homes, condominiums and small businesses. Smaller parcels create openings in the tree canopy providing sunlight and space that exotic species can invade. Individual homes and subdivisions change the landscape grade, create openings, change drainage patterns and affect plants and animals. Many forest plant and animal species depend on large areas of unbroken forest cover to survive. As more land is disturbed, the forest is less capable of cleansing the air, protecting water quality and sustaining animal habitat.

Northern Wisconsin is especially hampered by these trends as larger tracts of private forestlands owned by industry are under increasing pressure. As surrounding land is sold and an area urbanizes, corporations see increased values in their assets. As power lines, utility corridors, sewers, roads and public water supplies reach the forest fringe, the alternatives to keeping surrounding lands in forests increase. And, more people and homes in the forests create more opportunities for forest fires and problems associated with fighting forest fires.

Records indicate that nearly 90% of the industrial lands in the north have changed ownership in the last two years prompting DNR foresters and the forest products business to look for incentives to sustain land as forests. Last year, Wisconsin applied for acceptance into the Federal Forest Legacy Program (FLP) that compensates forest owners by buying the development rights on environmentally important parcels of private land. Wisconsin received $1 million to begin implementing the legacy program this year.

Non-industrial private landowners now own 61% of Wisconsin's forest lands. They are managing their woodlands and showing strong interest in the state's forest tax laws, the forest stewardship program, the Wisconsin Forest Landowners Grant Program and numerous federal cost-sharing incentives.

Individuals continue to buy forestland at an astonishing rate, driving up the values and reducing the size of parcels that most can afford. Today's private landowner owns an average of 37 acres. The 260,000 owners find their property taxes continue to rise as the land value rises. They are turning to the Managed Forest Law in record numbers to seek tax relief. Their main concern is a provision that provides a tax incentive to people who leave their land open for public access. Many private owners (75% of the 120,000 acres entered for 2001 in the program) forego the better tax rates to keep their small parcels closed to the public. This puts added pressure on public forest lands and industrial forests that remain open to the public to sustain outdoor recreation, even at the expense of commercial timber harvest.

Bob Manwell

DNR files

Top: Operation Migration tested if cranes can be taught to migrate to wintering grounds.

Above: wolves

Right: Eastern prairie white-fringed orchid

Thomas Meyer

Endangered resources

Bald eagles, timber wolves and trumpeter swans are signs of Wisconsin's success in helping native species recover. Now, the state also is playing an important role in returning whooping cranes to their former range east of the Mississippi River.

The whooping crane, which was on the verge of extinction in the 1940s when the total population dipped to under 20 birds, is slowly recovering with a population of just over 400. In 1999, the Eastern Whooping Crane Partnership was formed to aid recovery. Partners include the DNR, U.S. Fish and Wildlife Service, Operation Migration, International Crane Foundation, Natural Resources Foundation of Wisconsin, the International Whooping Crane Recovery Team, Patuxent Wildlife Research Center, the National Fish and Wildlife Foundation and others.

A milestone was reached when a flock of sandhill cranes arrived in Florida on Nov. 11, 2000. The cranes completed a 40-day, 1,250-mile journey flying behind an ultralight craft after leaving the Necedah Wildlife Refuge in Wisconsin.

The sandhill cranes' trip was a successful trial migration to help determine whether a similar migration with whooping cranes should proceed. Based on this trial migration, it looks like this approach will now be applied to whooping cranes. The sandhill success set the stage for partners in the reintroduction effort to begin working with whooping crane chicks.

Wisconsin still lists dozens of plants and animals that are endangered or threatened with extinction because their populations have dropped to only a few sites or because they have always been rare and therefore found at only a few sites. There are currently 41 invertebrate species on the state endangered or threatened list, among them several freshwater mussels, beetles, and mayflies. There are 118 plant species listed as endangered or threatened, 26 birds and 21 fish. Two mammals—the timber wolf and American marten—are on the list, although the timber wolf has recovered to the point that DNR is seeking to move the species' status from endangered to threatened.

State Natural Areas

A key component of efforts to protect Wisconsin's endangered and threatened species is the State Natural Areas program, which turns 50 years old this year. The Wisconsin State Natural Areas (SNAs) program was the first of its kind in the nation. SNAs harbor ecosystems that have escaped most human disturbance and represent Wisconsin's native landscape diversity.

Wisconsin's 333 SNAs protect not only the land—prairies, forests, barrens and wetlands—but also lakes, ponds, streams and rivers with different physical characteristics harboring diverse animal

populations. These natural systems are important "benchmarks" for comparison to sites the DNR intensively manages. They also provide opportunities for scientific research and environmental education.

The program partners with groups including land trusts, conservation organizations, universities and local governments to protect and improve the quality of Wisconsin's waters by designating SNAs on properties they own. The Wisconsin Chapter of The Nature Conservancy has established several preserves with a goal of protecting entire aquatic systems and the ecological processes that support them. These sites include the Mink River Estuary in Door County, Lulu Lake in Walworth County and Summerton Bog in Marquette County.

In recognition of Wisconsin State Park system's 100th anniversary in 2000, 16 existing SNAs within state parks were given full legal protection so they will remain in their natural state in perpetuity. Last year, the DNR also launched a project called the Lower Chippewa River State Natural Area, designed to protect the river corridor and adjoining bluff prairies.

Thomas Meyer

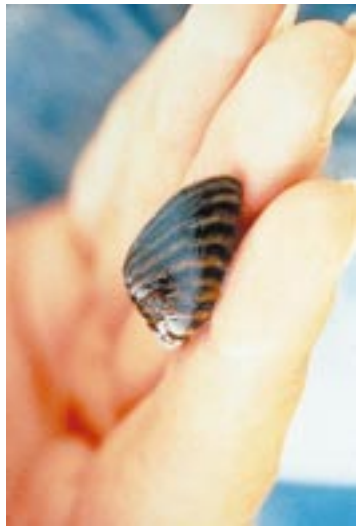
Exotic species

Exotic aquatic species such as zebra mussels, carp, Eurasian water milfoil and purple loosestrife have been introduced into Wisconsin waters and are spreading to inland waters. Eurasian water milfoil entered the state in the 1960s and has since infested more than 338 waterbodies in 54 of Wisconsin's 72 counties. Exotics such as the round goby and spiny water flea also have recently been discovered in the Great Lakes.

Exotic species often lack the predators they had in their home waters, so they often out compete native species for food and habitat, can harm native fisheries, and in turn, the people and businesses that rely on those resources for income, scenic beauty and recreation. Eurasian water milfoil curtails boating and zebra mussels form dense colonies that clog water intake pipes at electrical utilities, municipal water supply treatment plants and industries.

Through a budget initiative the DNR is seeking to begin the kind of coordinated, comprehensive program that Minnesota has had for a decade. It has proven successful in slowing the spread of exotics and controlling them through information, education and watercraft inspection.

Invasive plants also present a problem for native plants as they invade natural systems and proliferate, often dominating a community by competing for nutrients, sunlight and space, and by altering the food web or physical environment. Invasive species also may prey on or hybridize with natives. Buckthorn, Siberian elm, spotted knapweed, garlic mustard, wild parsnip, purple loosestrife and reed canary grass are among the invasive species many people know.



Zebra mussel—an exotic intruder

Buckthorn plantain

Eurasian water milfoil

Baraboo Hills

Mussels

In 2000, DNR staff worked to protect endangered mussels threatened by zebra mussels. Attention focused on the federally endangered Higgins Eye Pearly mussel and the 11 state-listed species. Some of these mussel species have been salvaged and relocated. At mussel beds listed as "essential habitats" in the Mississippi River, native mussels were scrubbed of zebra mussels, identified with a mark and collected for a late fall relocation to mussel beds in the upper pools of the Mississippi River above Prescott, which are relatively free of zebra mussels. Consequently, native mussels may survive there and be available for future re-introduction efforts. DNR and the U.S. Fish and Wildlife Service also teamed up to propagate and culture juvenile Higgins Eye Pearly mussels at a federal fish hatchery.

All of these efforts to protect endangered resources and state natural areas are supported by Wisconsin citizens through tax-deductible donations to the Endangered Resources Fund on state income tax forms (that are matched with up to $500,000 of state funds) and by purchase of special timber wolf vehicle license plates for Endangered Resources. These two efforts raise approximately two-thirds of the funding for the Endangered Resources Program.

Forest health

Native and non-native insects, diseases, weed species and catastrophic weather challenge our forests' health. To monitor the effects, Wisconsin's forests are annually inspected for signs of disturbance via aerial and ground surveys, and permanent forest health monitoring plots. Concerns last year included advancing gypsy moth infestations in eastern Wisconsin, heavy tree defoliation by forest tent caterpillars in northern Wisconsin, and damage from major hail and windstorms.

Rich Phalin

Forest tent caterpillar

Scattered oak, aspen, ash, birch and crabapple trees were defoliated in 2000 in Lincoln, Oneida, Forest, Langlade, Florence and Vilas counties. Some areas have been infested for two consecutive years. An aerial survey in late June estimated that approximately 101,195 acres are infested by forest tent caterpillars in Forest, Lincoln and Oneida counties. Egg mass surveys conducted early in 2001 will help predict 2001 defoliation levels. A third year of defoliation will initiate dieback and decline in northern hardwood forests.

Gypsy moth

In spring 2000, 81,201 acres of land in central Wisconsin were treated as part of the "Slow the Spread" program to retard the westward expansion of the gypsy moth. Sixty-three sites, totaling 58,246 acres, were sprayed two times with Btk, a pesticide that is toxic to moths but not to people and wildlife. An additional 13 sites, totaling 22,955 acres, were treated once with pheromone flakes, which will help disrupt gypsy moth mating. In eastern Wisconsin, where the gypsy moth is established, the population continues to increase and a few communities have begun to experience defoliation, particularly in oak-dominated parkland. In response to the threat of defoliation by gypsy moths in 2001 the DNR is offering counties and municipalities the option of participation in a federally cost-shared, state-organized suppression program. The program is voluntary, landowners must agree to the treatment and local funds must be provided to match the share contributed by the USDA Forest Service.

The gypsy moth caterpillar, the ravager of our forests' hardwoods

Chapter Four

Making People Our Strength

Volunteers building fish cribs

Link to DNR Strategic Plan:
http://www.dnr.state.wi.us/aboutdnr/plans/

The DNR shares responsibility for stewardship of Wisconsin's natural resources with citizens, organizations, tribes and officials. Together we provide the state with healthy, sustainable ecosystems and share knowledge, responsibility, decision-making, recognition and costs.

Routinely, DNR staff reach out to the citizens at youth camps and public meetings, through sports and special interest groups. They assist treatment facilities and other agencies, and provide a high level of service to permit applicants and others who need assistance or guidance.

More than two-thirds of the DNR's workforce is assigned to field offices in five regions. In addition, there are DNR Customer Service Centers located throughout the state to answer questions. Staff draw on expertise from many DNR disciplines and combine their efforts with partners to manage public resources and increase department effectiveness.

The DNR's partnerships are wide ranging. They include large projects such as assessing the status of arsenic in drinking water supplies to smaller partnerships like one-on-one citizen contact. The DNR, for example, has brought in partners such as the University of Wisconsin Cooperative-Extension to be liaisons on the DNR's State Park Interpretive Team, which is conducting a needs assessment for the interpretive (naturalist) programs at state parks, wildlife areas and fish hatcheries.

If you fish, hunt, swim, boat, enjoy Wisconsin's scenery, drink water, breathe air, dispose of trash and use electric power, you have a relationship with the DNR.

This chapter describes some partnerships that tap Wisconsin's most valuable resource—people—and set priorities, accomplish tasks and evaluate successes in Wisconsin environmental quality and science-based management.

Citizen's Natural Resource Academy

Another Citizens' Natural Resource Academy (CNRA) class graduated last year with a variety of DNR staff, partners, legislators and Natural Resource Board members participating. The first CNRA was held in 1998.

The CNRA creates an information exchange about DNR programs and responsibilities between adult residents of the Upper Green Bay basin and DNR employees. The scope of DNR work is discussed and explained, including wildlife and fish management, air, shoreland and water quality protection, law enforcement, drinking water quality, fire control, forestry and more. The Academy brings citizens and natural resource agency staff together to learn.

Since completion of the course, participants have volunteered to work with DNR basin educators on various public outreach initiatives. CNRA alumni also serve on DNR partnership teams.

Lake Leaders Institute

Managing Wisconsin's 15,000 lakes is an immense task and the DNR relies on citizen volunteers and the stewardship of individual waterfront property owners for help with everything from monitoring water clarity to temperature on lakes statewide.

The Lake Leader's Institute is one way citizens get involved. The Institute is a cooperative program developed by DNR with the University of Wisconsin-Cooperative Extension and the Wisconsin Association of Lakes to create a pool of informed, interested and effective lake advocates.

Last year, 29 citizens spent a week in the classroom and on Wisconsin waters to complete courses in lake ecology, lake management and civics to gain the tools and knowledge necessary to help them turn their love for Wisconsin lakes into action. It was the third Lake Leader's Institute class and graduates of the first two institutes already have been elected to town boards, the Wisconsin Association of Lakes Board, and county lakes association boards and have helped form new lake associations.

Last year's participants were asked to make a commitment to carry the information and insight they gained during the institute back to their communities, with each writing a pledge describing how they would do that.

Wisconsin lakes strategy

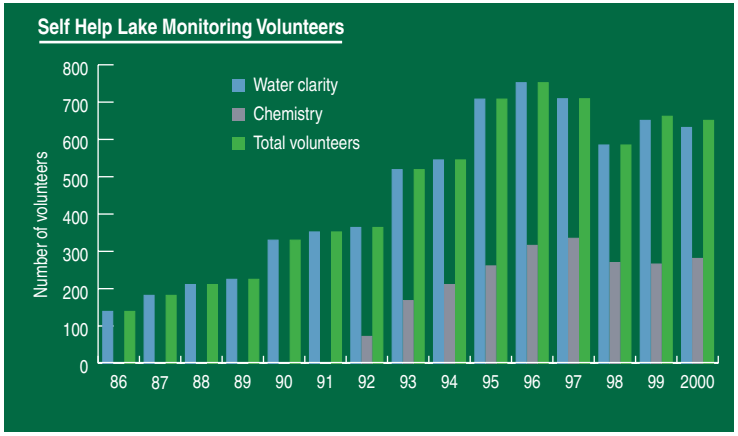
A long-term partnership among the Wisconsin Association of Lakes (WALS), University of Wisconsin-Extension (UWEX) and the DNR has provided leadership and directions to lakeshore homeowners and communities to protect and restore Wisconsin lakes. Whether the issue is lakeshore zoning, reducing on-water conflicts, assessing lake health, reducing lake contaminants, funding lakeshore recreation or guiding lakeshore development, communities have sought expertise from these institutions. Recently WALS, UWEX and DNR scoped out a second ten-year strategy to guide lake protection.

Lake Leaders Institute

Robert Korth

Wisconsin Association of Lakes Convention

The Wisconsin Lake Strategy plan is available at **http://www.dnr.state.wi.us/org/water/fhp/lakes/stratplandraft.doc**



Theresa Stabo

The DNR has followed WALS' strategic plan and it has served Wisconsin well. The Wisconsin Lakes Partnership also is focusing on engaging more people in lake protection, helping communities promote healthy lake habitats and seeking funds for lake enhancement.

To reduce conflicts among boaters and other water users, the plan calls to expand boater education to include information about lake ecosystems, require boat operators to be licensed and require them to inspect that any craft they launch is free of exotic species.

To engage more people, the partners will make educational materials more readily available, sponsor workshops and develop community guides to work more with town officials. Partners will bolster successful programs where volunteers adopt-a-lake, monitor lake conditions and keep vigilant for signs of invasive plants and animals.

Some lake associations have made much progress working with landscapers and realtors to restore natural-looking shorelines. Understanding how lakeshore and second rings of homes near the lakeshore affect water quality is critical to slowing soil, nutrient fertilizer and septic seepage into lakes.

The chart shown here illustrates the numbers of lake citizens who have volunteered to help with lake monitoring since 1986 as well as the monitoring efforts that they are involved in on Wisconsin lakes.

Yellow River Flowage shoreline project

The Yellow River Flowage shoreline within the Gov. Tommy Thompson Fish Hatchery in Spooner was one of six shoreland habitat restoration demonstration areas chosen in 2000 on public property across the state. Protecting shoreline habitat is important since wild shores shelter a uniquely rich and diverse habitat for birds, frogs and other animals that live there. Shoreline vegetation also helps control runoff of pollution, such as phosphorus and sediment, into the water.

The Yellow River Flowage project consisted of 700 feet of shoreline where previous landscaping practices included mowing much of the water's edge. A team of DNR staff, local zoning, county Land and Water Conservation Departments, school representatives, University of Wisconsin-Cooperative Extension, Master Gardeners and concerned citizens set goals for protecting water quality and fish and wildlife habitat, developed a restoration plan, implemented the plan and held public field days. The primary goal of the project was to provide one easily accessible location to show a variety of restoration practices and theories. This goal was accomplished in many ways.

Part of the shoreline was replanted with native northern grassland species and an area of natural recovery (landowners stop mowing and allow the area to re-vegetate) was established. A shrub

display area allowed the public to see shrubs that are both attractive and can be grown in the area. Alternatives to rock riprap such as "biologs"—logs made of coconut fiber that are staked and chained to the shoreline on which shoreline vegetation can root—were installed. Brush piles, rock piles and trees were put into the river to provide habitat for fish and other shoreline aquatic species.

A cemetery donated trees and a contest was held among local high schools to design signs that shoreline owners could put in their yards to advertise that a recovery project was under way. Two community field days were held.

We have learned that even small actions on the shore can impact the ecological health of our shores and waters. But, there is good news, too. The cumulative impact of many small actions also can restore and preserve our waters and shorelands.

Upper Green Bay Basin Riparian Integrated Ecosystem Management Project

The goal of the Upper Green Bay Basin Riparian Integrated Ecosystem Management (IEM) Project is to promote partnering in the basin to maintain and enhance water quality and biodiversity associated with shoreline and upland ecosystems on private lands.

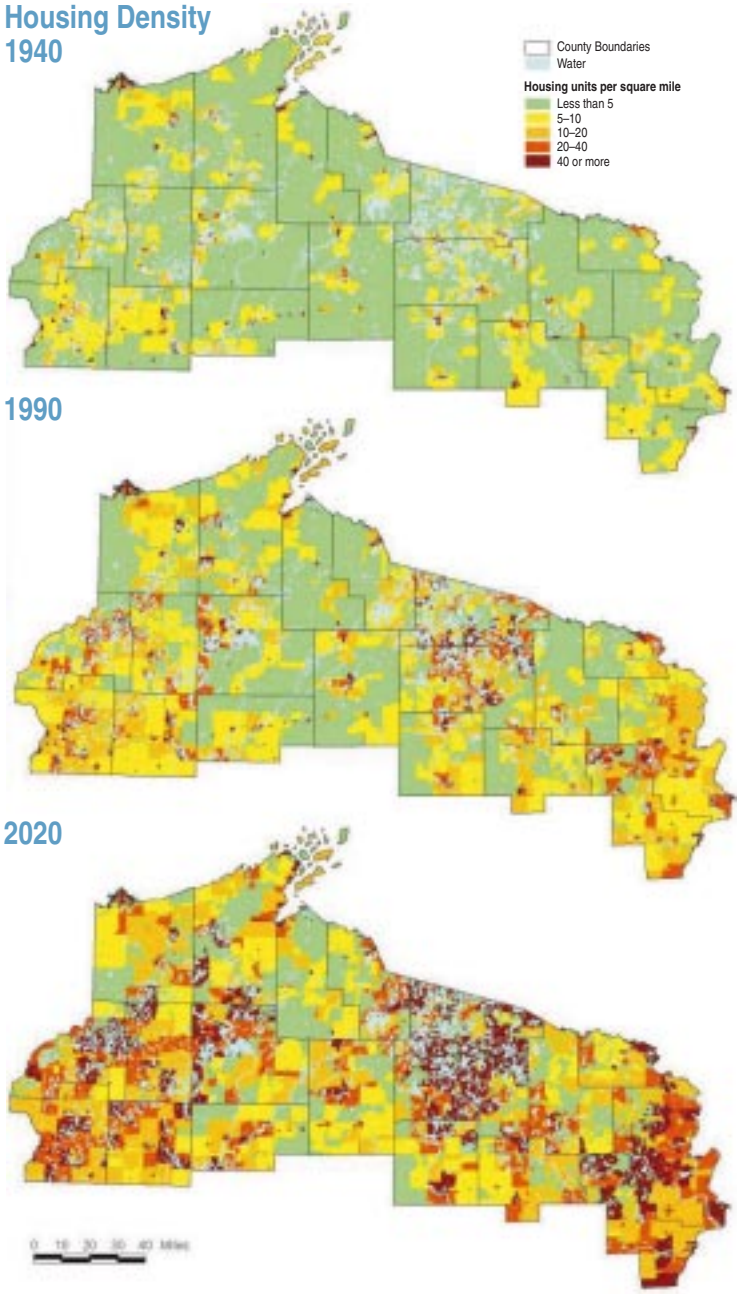
The DNR along with the Oconto County Association of Lakes and Waterways and the Shoreline Subcommittee of the Upper Green Bay Partnership hosted a Shoreline Restoration Open House last year for landowners. The goals were to introduce landowners to shoreline issues, tools available for shoreline restoration and the stewardship plan component of the project. The plan addresses water quality issues such as nonpoint source pollution, wetland areas, riparian areas (streambank), drainage systems, aquatic resources, impacts to fisheries and habitat, plus land issues and recreational and landowner uses.

Over 50 landowners attended, representing 21 lakes and two rivers. The DNR introduced them to what they can do to enhance their shoreline and protect the water quality of their lake or river system. One option discussed was creating or maintaining a buffer of native vegetation along the shoreline.

Open house participants browsed native plant options, learned how to attract wildlife to their land and discussed shoreline restoration techniques. Those with photos of their shoreline were able to use software to visualize how their shoreline could look of they implemented some of the restoration techniques. Nineteen additional landowners signed up to develop stewardship plans.

The Niagara escarpment in the fall

Housing Density



Maps courtesy of the Applied Population Laboratory, UW-Madison

Northern Initiatives Project

"Keep the North the North!"

That phrase captures the spirit of the Northern Initiatives project.

In 1995, the DNR began the Northern Initiatives project recognizing that the state's Northwoods are unique and that the public was concerned about protecting the area. Overwhelmingly, the public wanted to "Keep the North the North" and northern lakes, shorelands and rivers were of particular concern.

The DNR also recognized that this was a considerable effort that would require a coordinated approach and a committee of representatives from public, private, nonprofit and state organizations. The committee produced a report called the "Northern Initiatives Lakes & Shorelands—Strategies and Goals for Protecting Northern Lakes, Rivers and Shorelands," which identified four tools to preserve and safeguard northern lakes and shorelands over a ten-year period.

Those tools included education, voluntary conservation, technical assistance and land acquisition. Subcommittees were formed to evaluate the situation, brainstorm ideas and develop strategies for each tool.

To date, the Northern Initiative project educational highlights include an effort by the DNR, two Minnesota agencies, University of Wisconsin-Cooperative Extension, and the Burnett County Land Conservation District to produce two videos—"River: Ribbons of Life" and "The Living Shore." Riparian owner information packets also were created to help landowners realize the importance of healthy riparian and shoreland environments as well as who to contact for assistance.

In addition to the Yellow River Flowage shoreline restoration that was previously mentioned, Burnett County's Shorelands Incentives Program started giving lake property owners a tax break for maintaining a buffer along their shoreline. Sixteen counties began working on lakes' classification in their shoreland zoning ordinances.

Scott Mulcahy

The Nature Conservancy purchased the "Wolter

Tract"—2,189 acres of pristine land, which includes 15 lakes, and the wild Caroline Lake (120 acres). In addition, the state was able to purchase Evelyn Lake (55 acres), the Willow Flowage, and the 1999 "Great Addition" (the largest land acquisition in state history with more than 32,000-acres purchased in northern Wisconsin). Knowing that these areas will be protected and maintained for future generations will help "Keep the North the North!"

St. Croix County growth

St. Croix County is growing at a fast pace largely due to urban sprawl pressure from the Twin City metro area 15 miles west (25% growth in the 90s) and DNR staffing to address development in the area is challenged to keep pace. To meet that challenge, the DNR is relying on partners in the county to help. A significant and helpful factor in St. Croix County's growth is the adoption, in May, 2000, of a "smart growth" plan so that population pressures are anticipated.

The development pressure has lead to new residential subdivisions throughout the county and the "re-development" of small houses and seasonal cottages into much larger year-round houses, as well as a few subdivisions along the Lower St. Croix River. These two types of development pressure are handled in different but connected ways.

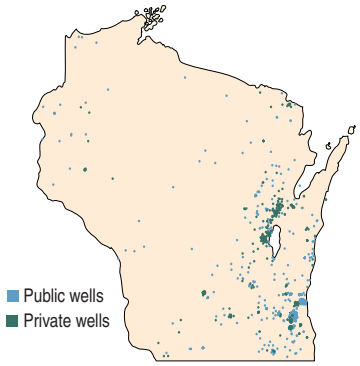
New residential subdivision plans are subject to many reviews from compliance with county shoreland ordinances to wetlands, floodplain and stormwater rules. To make subdivision review and processing as consistent, adequate and expeditious as possible, DNR and St. Croix County Land and Water Conservation staff have teamed up to jointly review plat plans, conduct site inspections and work with developers to revise plats to meet all applicable standards.

These efforts are compiled into recommendations and comments and are provided to the county zoning office staff. County zoning staff conveys these comments to County Planning, Zoning and Parks Committee at its public meeting.

Some reviews for re-development of existing residences along the St. Croix River are a joint review process with the county as well, but may include the solicitation of comments from the Minnesota Department of Natural Resources and the National Park Service through the Lower St. Croix Management Commission.

The coordinated, joint review in place in St. Croix County prevents wetlands from being turned into stormwater ponds or being filled to create buildable area or roads. It ensures that erosion control measures are in place to prevent disturbed, exposed soils from eroding into wetlands, navigable waters and onto other properties. It also ensures the installation or preservation of vegetative buffer areas adjacent to wetlands and navigable waters, and ensures adequate lot size for well, septic and neighbor setbacks. Most importantly, the review that takes place for the

rural projects in St. Croix County makes sure that the regulated community is dealt with in a consistent manner.



Wells where arsenic has been detected

Arsenic

DNR staff have relied on partnerships to address the emerging issue of unsafe levels of naturally occurring arsenic in impacted groundwater supplies especially in Outagamie and Winnebago counties where the bedrock is high in arsenic. Arsenic is a known killer in large doses and may cause cancer for long-term exposure at the parts per billion concentration levels.

Partnerships were developed with local health agencies, state health agencies, the Department of Commerce and local towns to complete well sampling to determine if wells exceed the safe drinking water standard.

The DNR helped establish a statewide work group of professionals who have expertise related to naturally occurring arsenic in groundwater. The group includes DNR staff, other state agencies, EPA, the U.S. and Wisconsin Geological Surveys, University of Wisconsin system, University of Wisconsin-Cooperative Extension, local county health departments, the National Institute of Health and the Wisconsin Water Well Association.

A public information brochure on arsenic was created by the DNR in cooperation with the State Department of Health and Family Services.

Informational meetings were held in many of the townships in the Lower Fox River area last year to educate the public on arsenic in their water supplies. Representatives from the DNR, Wisconsin Division of Public Health, and the Department of Commerce gave presentations and included information about drinking water standards, geology, possible health effects of arsenic and possible solutions.

Trout stamp revenue

The incentive to restore trout streams in Wisconsin came from conservationists through their legislators who supported self-imposed fees for Wisconsin's trout stamp in 1977. Proceeds are strictly designated for improving and maintaining inland trout streams by working on stream channels and their immediate surroundings. The consistent stream of money pays for long-term habitat improvements rather than relying on stocking, which only temporarily improves fishing. About 130,000 stamps have been sold annually in Wisconsin over the past ten years.

Using trout stamp money and some funding from fishing license sales and federal funds, more than 550 miles of 400 different coldwater streams have been improved. In fact, Wisconsin now leads the nation in miles of Class I trout streams—3,500 miles.

State fisheries crews work with partners such as local communities, Trout Unlimited and sportsmen's clubs to complete projects funded with trout stamp revenue.

The Brule River Sportsmen's Club, for example, has been a major partner in restoring the Bois Brule River in Douglas County. Since 1994, the partnership has rejuvenated spawning locations along the upper Bois Brule River. About 2.1 million pounds of gravel have been added to 35 historic spawning sites. The club sets aside workdays to help complete some of the major projects. Hundreds of volunteers have participated from the club as well as from other clubs including, Lake Superior Steelheaders, Arrowhead Flyfishers and the Douglas County Fish and Game League.

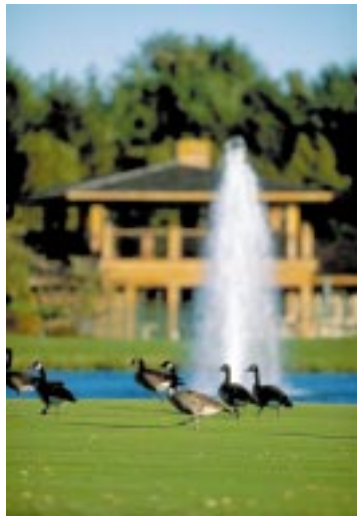
Dam removal

About 60 dams have been removed from Wisconsin streams in three decades—the largest number of dam removals in the nation. But Wisconsin also has a large dam concentration with over 3,500 dams. There are safety issues and environmental reasons to return rivers to a free flowing condition. For a community with a tight budget, economics alone can be an argument for dam removal. The cost of repairing a small dam is on average 300% greater than the cost to remove a dam.

The 1998 removal of the Waterworks Dam in Baraboo was a partnership and is evidence of how dam removal can be a river restoration tool. Dams transformed the Baraboo Rapids segment of the Baraboo River from a fast-moving stream with healthy fish populations to a series of sluggish impoundments. The river once supported a spawning lake sturgeon population but became known for its carp.

By removing the dam, three-quarters of a mile of high quality riffle habitat, rare in southern Wisconsin rivers, was restored to its free-flowing condition. Only 18 months after the dam was removed, the DNR found 24 species of fish in the newly free-flowing stretch of the river, the dominant species was smallmouth bass instead of carp and the water quality was significantly improved. Partners in the project included DNR, the City of Baraboo, the Baraboo River Canoe Club, the River Alliance of Wisconsin, the State Historical Society, Circus World Museum and many others.

There are dozens of other examples of habitat restoration partnerships underway in Wisconsin. Visit the Internet at **http://www.dnr.state.wi.us/org/water/fhp/fish/trout/stamprep.pdf** for a report describing other inland trout habitat improvement projects.



North American Waterfowl Management Plan

One of the great success stories in cooperative resource management is the partnership of government and private groups in the North American Waterfowl Management Plan.

The plan fosters stronger migratory waterfowl populations from northern Canada through Mexico. Populations of ducks, geese and other migratory waterfowl are estimated on the breeding grounds and nesting success is monitored through the nesting season along 2,600 routes in the U.S. and Canada. These estimates form the basis of hunting policies in the Canadian provinces, United States and Mexico for how many waterfowl can be harvested while sustaining healthy waterfowl populations. The plan for Wisconsin, part of the Mississippi Flyway, extends from breeding grounds of the boreal Canadian forests of Saskatchewan to Manitoba and Ontario south to the Gulf Coast states.

The plan also serves as a forum for international work to restore wetlands and other waterfowl habitat. During 1998-99, the most recent year for which records have been compiled, waterfowl populations continued to recover and abundant rainfall kept wetlands breeding areas in excellent shape, particularly in the Prairie Pothole Region of the U.S. to the west of Wisconsin and on our own Mississippi River Flyway area.

In Wisconsin, 13,315 wetland acres were acquired between 1998-99, another 11,072 wetland acres were restored and 3,645 acres enhanced for waterfowl. The total number of ducks surveyed in 1999 exceeded 43.4 million, the largest population size estimated since breeding bird surveys began in 1955 and well above the waterfowl management plan goal of 36.4 million ducks.

Trends for other birds are more varied. There is an overabundance of snow geese that are eating their breeding habitat out of existence and giant Canada geese that are a nuisance in urban areas. On the other hand, grassland nesting birds populations have been declining since the 1960s. More than 77% of the grassland species show continuing declines. American woodcock surveys in 1999 indicate breeding populations were stable in the eastern U.S., but decreasing in the central U.S. Restoration programs for songbirds that migrate even further into the tropics also are fighting an uphill battle to recover these dwindling species across their extensive ranges, especially as tropical habitats are reduced.

Sharing the hunt

Wisconsin's deer seasons offer more opportunities than ever to share your harvest with others. Sharing extra venison shows that hunters care about their community and can also help manage our overabundant deer resource.

In fact, Wisconsin deer hunters donated 7,764 deer to meat processors from the combined 2000 deer hunting seasons resulting in approximately 350,000 pounds of meat donated to food pantries across Wisconsin. The estimated costs of the deer donation program were $489,000, with $392,000 for processing and $97,000 for administration and advertising. The program was paid for out of the Wildlife Damage Abatement and Claims Program, which is funded through the sale of bonus antlerless deer permits.

While the venison shared in this program cost about $1.12 per pound after processing, by comparison, ground beef costs about $1.50–$2.00 per pound in grocery stores. Some of the program highlights included:

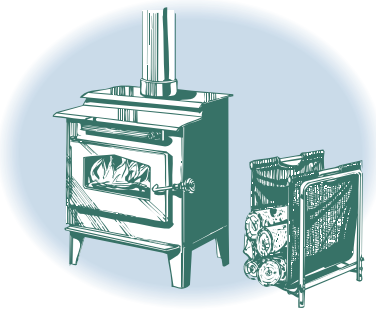
- Of 68 eligible counties, 65 participated in the program.
- Dick's Quality Meats of Mount Horeb in Dane County processed the most deer with 236.
- A hunting group of 13 hunters out of Rio in Columbia County donated 27 deer.

The program was the result of partnerships forged among federal, state and county agencies, nonprofit volunteer organizations and processing plants statewide. Partners included more than 160 venison processors, nonprofit partners Hunt for the Hungry and Hunters against Hunger, food pantry volunteerss and agencies such as the U.S. Dept. of Agriculture—Wildlife Services (Waupun and Rhinelander districts), Wisconsin Dept. of Agriculture, Trade and Consumer Protection, and DNR.

Registering deer so that the DNR can measure herd health

Wood stoves, air quality and you

The Great Lakes Wood Stove Changeout program, which ran from February through April, 2001, will improve air quality by supporting the changeout and disposal of old, inefficient wood stoves. Inefficient wood stoves contribute to air and water pollution by releasing particulates, volatile organic compounds (VOCs), as well as polynuclear aromatic hydrocarbons (PAHs), including benzo-*a*-pyrene. EPA research indicates that a larger percentage of PAHs released in the Great Lakes region come from older wood stoves.



DNR offered a $200 incentive payment for every old stove changed out and properly disposed (taken to a salvage yard) through participating retailers in a Great Lakes Basin county. Hearth products retailers offered a percentage off the price of new stoves (including gas, wood, and pellet) statewide. This program offered citizens a way to take action to improve their air quality.

Wisconsin's new Tommy G. Thompson Centennial State Park

Environmental Cooperative Agreements

In February 2001, DNR and Wisconsin Electric Power Company (WEPCO) signed the first Environmental Cooperative Agreement, under which the utility committed to pursue environmental improvements beyond those required by current regulations. Under this agreement, WEPCO will recover and re-combust coal ash from its landfills as a fuel source at its Pleasant Prairie Power Plant in Kenosha County, creating a new marketable by-product that can be used by the concrete industry. This recovers the remaining energy in the ash not used by earlier boiler technology, reduces the use of coal, lessens dependence on landfills, and protects groundwater. The company also will implement a facility-wide environmental management system at the plant to identify and further minimize the plant's environmental impact. In return, the DNR will streamline permitting procedures (thereby hastening other environmental improvements), eliminate unnecessary monitoring or reporting requirements, and increase electronic information sharing to reduce paper use and speed decision making.

The Cooperative Agreement exemplifies the efforts of DNR and WEPCO staff to create a positive atmosphere in our working relationship. In developing the agreement, professionals from the company and DNR have increased their communication, and consequently have reached a higher level of trust and a common understanding of environmental goals. This has resulted in WEPCO proposing an innovative, if not radical, approach that has moved beyond environmental protection to environmental restoration. It also has allowed pursuit of a multi-pollutant strategy that does not transfer environmental effects from one medium at the expense of another. It is the hope of both parties that this agreement can open a path for other companies to pursue comprehensive strategies that provide a higher level of environmental performance than available under the existing regulatory framework, thereby demonstrating that what's good for the environment is good for business.

Chapter Five

Providing Outdoor Recreation

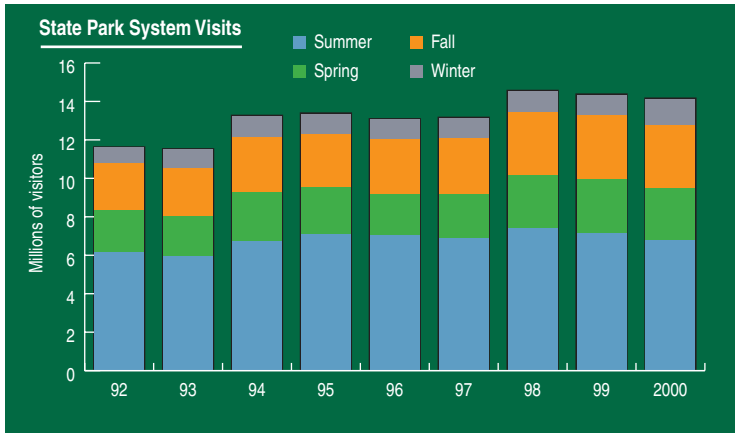
Whether you fancy fishing, swimming, wildlife watching, hunting, hiking, biking or gathering wild foods, Wisconsin provides experiences worth harvesting in every season.

The numbers are impressive, but they don't tell the whole tale:

- 15,000 lakes
- 44,000 miles of rivers and streams
- 215 wildlife areas of almost half a million acres to roam and explore
- 285 public fishing areas
- 333 State Natural Areas that preserve desert, tall timber, wetlands, prairies, savannas, bluffs and spectacular vistas
- more than 500,000 acres of state forests with trails, campgrounds and solitude.

Yet, all of this abundance provides only 12% of our public investment on recreation statewide. Counties and towns spend seven times as much as the State of Wisconsin to provide forests, parks, city greenery and play spaces like swimming pools, tennis courts, soccer fields and baseball diamonds.

Several forces keep the demand for outdoor spaces strong. More of us live in urban areas and are willing to travel to enjoy open spaces. According to the Center on Wisconsin Strategy, UW-Madison, from 1992 to '97, Wisconsin lost 275,000 acres of cropland to development—averaging 151 acres a day. In the last 50 years, the state has lost one-third of its farmland—nearly 8 million acres to urbanizing development. To put this into context, Wisconsin's total land area is less than 35 million acres.



We also are sports nuts and Wisconsin has more golfers per capita than any other state. There is a strong commitment here to team sports like softball and soccer, as well as activities such as boating, snowmobiling, cross country skiing, mountain biking, in-line skating and snowshoeing.

In addition, we have opportunities to mix exercise with fun-filled weekends: Bed and Breakfasts along bike trails; organized nature hikes and campouts; courses to learn kayaking or canoeing; trails for horseback riding, mountain biking and in-line skating.

A strong state park system celebrated its centennial in 2000, capped by the purchase of two new parks properties—Capital Springs Centennial Park southeast of Madison and the Governor Tommy G. Thompson Centennial State Park in Marinette County. Also, a Land Legacy Study is examining what locations should be protected during the next 50 years.

Trails are a rapidly growing component of outdoor recreation in Wisconsin. To show the importance of the trail system, we will be celebrating 2002 as Wisconsin's Year of the Trails. With our partners, we are planning a year full of events, public gatherings and discussions to promote and celebrate the nationally recognized Wisconsin state trail system.

In 2000, for the third year in a row, Wisconsin State Park System properties recorded more than 14 million visitor days. In the last two years, total visits decreased slightly, but the number is still significantly higher than in 1992 and 1993. The greatest increase has been in winter use, up 75% since 1992. Spring and fall visits have increased more than summer visits.

For more information on Wisconsin's outdoor recreation opportunities, you can visit the following web sites:

Trail information:
http://www.dnr.state.wi.us/org/land/parks/trails

Candleålight skiing information:
http://www.dnr.state.wi.us/org/caer/ce/news/candlelight.htm

Weekly outdoor report:
http://www.dnr.state.wi.us/caer/ce/news/or/

Or call 608/266-2277.

Making the connection

Some areas have to be purchased to preserve them, and the goal of Wisconsin's land acquisition programs is to wisely invest in resources today that will provide for better living tomorrow. Land acquisition can be a significant bridge between natural resources and public demand for outdoor recreation. Acquiring land—through full title purchase, easement or lease—creates numerous benefits and opportunities. Each parcel that is acquired or donated from willing, conservation-minded landowners helps preserve a spectrum of soil, waters, air and outdoor experiences. Whether the parcel is a small portion of water frontage or a large block of forestland, it can provide spaces, access and opportunity for people, plants and wildlife alike. Here are some highlights of state properties acquired in the last century:

- over 1,000 miles of stream frontage, including more than 114,000 acres of designated fish management areas
- more than 500,000 acres of state forestlands
- nearly 90,000 acres of state park lands, including over 1,700 miles of trails
- almost 500,000 acres of wildlife management lands that provide habitat, hunting places and quiet spots for nature study
- over 117,000 acres of riverway and flowages

The DNR's land acquisition efforts are managed by the Real Estate Section of the Bureau of Facilities and Lands, supported by 25 real estate staff in DNR regional offices. The real estate program connects a legislative mandate to protect and preserve natural resources by acquiring natural resources of statewide significance. Lands are only acquired from willing sellers based on fair market value as determined by appraisals.

The agency also pursues partnerships and uses other tools to meet conservation and recreation goals without purchasing lands outright. Local land trusts are doing an excellent job of identifying parcels with special natural attributes and working with local landowners to preserve those places. Partnerships with local government can create corridors along rivers, link biking trails, encourage regional tourism, and provide food and lodging for visitors to parks and places that can only accommodate day traffic.

Hooked on fishing

Keeping the public hooked on fishing as an outdoor recreation seems obvious. After all, Wisconsin has lakes, rivers, streams and ponds available statewide. But license sales have flattened in recent years despite plentiful opportunity. Part of the reason may be changing lifestyles and more options for spending leisure time. Part of the reason may be that youngsters don't have a parent or other close relative to take them fishing and teach fishing skills.

The DNR angler education program was started to reaffirm and revitalize fishing as a worthwhile leisure activity and to promote fishing as a lifetime sport. Several efforts introduce youngsters and adults to fishing and the outdoors—Free Fishing weekend in early June, angler education programs at schools, more public piers on lakes and even special fishing events for people with disabilities have been underway for some time.

Fishing clinics provide hands-on experience. The Learn to Fish Program gives novice anglers a one-time chance to fish without a license. Fishing Coaches (for those over 18) and Youth Fishing Buddies (for those under 18) provide instruction. After attending a training workshop, volunteers

Rich Phalin

For a listing of popular fishing places, visit the Internet at:
http://www.dnr.state.wi.us/org/water/fhp/fish/4index.htm

implement the program in their school, community or camp while the DNR provides access to equipment, supplies and literature.

The DNR Tackle Loaner Program provides free use of fishing equipment at 30 sites in Wisconsin. *The Hooked on Wisconsin Anglers Club* recognizes outstanding sportfishing accomplishments. The state also has an urban fishing program and the DNR's urban fishing coordinator visits schools and other groups to discuss the program. The state's 14 fish hatcheries and three spawning facilities have been made more fun to visit through displays, observation areas to see hands-on fish management and self-guided facility tours.

The Reel Kid's Klub began in 1998 as a model that communities could use to organize local chapters similar to scouting troops or 4-H Clubs. The first chapter began in Alma where 13 members were initiated. Since then, the Great River Anglers Chapter has held meetings, taken fishing trips, invited in guest speakers and created a fishing book library and newsletter. About 32 kids now take part in the club and 80% of the original members remain active.

The DNR selects a new theme and designs a different flag each year. For more information about the project call (608) 267-2463. Or visit:

http://www.dnr.state.wi.us/org/caer/ce/eek/earth/earthday.htm

Earth Day Flag Project

Along the bluffs of the Mississippi, students and teachers from St. Gabriel's School and businesses from Prairie Du Chien have reclaimed a prairie. In the rolling hills of the Kettle Moraine, students from Kettle Moraine High School have implemented a program to remove invasive plants. These are just two of the more than 700 schools and over 100,000 students that have participated in the Earth Day Flag Project since 1995.

The goal of the program is to encourage educators and their students to select an environmental topic, learn about that issue and then complete an action project that would benefit the environment and their community. The flag provides recognition for their efforts, for these students are the next generation of stewards for Wisconsin.

Heading off on-water friction

No segment of outdoor recreation is increasing faster than the explosive interest in boats and personal watercraft. The explosive growth of personal watercraft (Jet-Ski type vehicles or PWCs) on state waters (from 5,400 in 1990 to 33,300 in 1999) can be hard on aquatic habitat and on other water users. PWC's noise level, speed and ability to maneuver close to shore have caused conflicts among boats, anglers, swimmers and those on shore who are seeking lakeside solitude. Greater development on lake and river shorelines leads to more demand for water-based recreation, which leads to greater possibilities for recreational conflict involving all users, not just PWC operators.

The number of motor boat registrations has increased more than 10% since 1990; more than 25% since 1979; and, grows by 20,000 craft a year. We expect another 5.7% increase in the number of motor boating participants by 2010. Surveys indicate an average of 40% of Wisconsin citizens boat each year, and this level of participation is expected to continue growing. In 2000, Wisconsin waters were used by nearly 1.6 million boaters, and this is expected to rise to about 1,658,000 boaters by 2010. The number of canoeists, jet-skiers and sailors is also expected to increase by about 4% over this period.

Increased boating traffic combined with bigger boats can have a number of negative effects on lakes, rivers and outdoor enjoyment. Propellers stir the water, re-suspending sediments and pollutants, disturbing fish habitat and destroying aquatic plants in shallow waters; boat wakes can disrupt wildlife and can cause shoreline erosion. To minimize the consequences of their activities, boaters are asked to observe the state's "slow-no-wake" rules.

Boating safety courses are encouraged for all boaters, particularly PWC riders and those who rent PWCs and may only operate them a few times a year. Every business that rents PWCs has a supply of educational materials for renters as well as decals for each machine outlining PWC laws and safety equipment. The newest toy to hit Wisconsin waterways is the water trampoline. A growing number of citizens complain that these devices are eyesores, navigation hazards and may harm fish habitat.

Wisconsin's parks celebrated their centennial in 2000!

In 2000, the DNR inaugurated the new Hank Aaron State Trail in Milwaukee.

*Filming **Into the Outdoors***

Friends groups provide valuable and much appreciated support to our parks and help keep them vital!

Into the outdoors: Why TV?

Casting an eye toward the future, the DNR decided the time was right to invest in a television show for youngsters about the state's outdoors and environment. The goal? To build a natural resources ethic in today's youth—tomorrow's citizens—by using television, a medium that kids enjoy, while satisfying demand for quality children's programming.

Through a new partnership, DNR is producing this television show with Discover Wisconsin Productions, Inc. *Into the Outdoors* hopes to:

- introduce children to Wisconsin's natural resources and environment
- show children how to appreciate, use, sustain and protect these resources
- teach children how interdependent we all are on our natural resources

The decision to help produce *Into the Outdoors* acknowledges a sober truth: Wisconsin won't maintain a quality environment and abundant natural resources if future citizens don't know or care about nature's bountiful, but vulnerable, assets.

Into the Outdoors introduces the sights and sounds of nature, visits nearby places to have fun outdoors, and demonstrates how to keep Wisconsin's environment healthy to enjoy "the good life" now and in the future. The show features children taking part in many outdoors and environmental programs offered in Wisconsin from safely and skillful hunting and operating an all-terrain vehicle to lessons about forestry, wildlife, water and air quality and recycling. Since January, this show has aired weekend mornings and encouraged families to spend time getting "Into the Outdoors."

To learn more, please visit:

http://www.intotheoutdoors.org/

Chapter Six

Where from Here?

We hope this report has provided you with some lessons from the past and examples of how you and your neighbors have played and will continue to play an important role in the state of Wisconsin's natural resources. Another purpose of this report, though, is to celebrate progress in improving many of Wisconsin's water, air, wildlife and recreational opportunities.

In addition, we are realistic and know that the future brings challenges. Among them:

- Large deer herds create more hunting opportunities, but more deer lead to greater forest and crop damage and accidents with motor vehicles.
- A growing population puts pressure on our finite terrestrial and aquatic resources, particularly endangered species, groundwater and wetlands.
- Invasive, exotic species threaten our lakes, rivers and forests.
- Global warming poses serious and increasingly clear threats.
- We also face challenges in protecting Wisconsin's groundwater supplies and assuring safe and adequate drinking water for citizens, farmers, businesses and the environment.
- Land use opportunities and threats to habitat, wildlife and fish, water quality and our quality of life.

Better water, air and land use; better and more coordinated resource management; and, an everyday commitment from all of us to use our natural resources wisely and prevent their contamination will assure the quality of Wisconsin's natural resources for the future. We must be aware of these issues today and plan now to meet them, lest they overwhelm our children. I know that you share this value with me, and that we're all doing our part to preserve Wisconsin's natural resources. Thank you!

Sincerely,

Darrell Bazzell

Edited by Tim Mulholland and Natasha Kassulke
Contributing writers were Tim Mulholland, David L. Sperling, Lisa Gaumnitz and Natasha Kassulke
Designed by Jeanne Gomoll
All photos by Robert Queen except where credited

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To send comments and questions about the second State of Wisconsin's Natural Resources report or to suggest topics to be covered in future State of Wisconsin's Natural Resources reports, click on the DNR's Internet site at **http://www.dnr.state.wi.us**

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Sunset on Lake Mendota

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